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CHEMICAL SCREENING OF CHIRATA (SWERTIA CHIRAYITA Karst COLLECTIONS FROM HIMACHAL PRADESH FOR BITTER CONTENT VARIABILITY

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ABSTRACT: *The investigations were carried out on collations of the herb made from natural habitats with altitudes ranging from 1500 m to 2700m. the material was subjected to chemical screening which revealed a great deal of variation ranging from 0.75 percent to 1.14 per cent wit respect to bitter content which is a pharmaceutically important component of this plant. Besides this observations were also recorded on the effect of root length and root thickness on the yield of bitter principles, observations recorded on soil parameters did not reveal any significant effect on the bitter content production except soil pH.*

INTRODUCTION:

Swertia chirayita a pharmacepoeial drug is well known for its use in indigenous and unani system of medicines for curing various human ailments (chandera sakar et al., 1990). It grows well in Himalayas and has a promise among the different naturally occurring herbs of himachal Pradesh During recent past, there has been a declining trend in its natural population at an alarming ratio because of indiscriminale exploitation. Fault management and ever increasing demand for this herb from the pharmaceutical industries, which collectively led to a scenario that our count is now meeting the requirements by importing this drug to the tune of 1.225 tonnes annually worth 0.038 million rupees in addition to its own indigenous resources (Gauniyal et al, 1991). Therefore immediate attention for boosting the production of this herb is required. One of the most important approach in this direction lies with developing suitable stains by selecting genetically superior lines from the existing population couples with suitable agrotechnique for bringing it under cultivation hence in view of its importance, this stud was conducted to identify the vest types in nature which can further be used for the improvement purpose so as to get increased production of bitter principles.

MATERIAL AND METHODS:

Sixteen collections of the herb was made from different places of the districts shimla, solan and Kinnaur of himachal Pradesh, which formed the base material for this study. Among these collections twelve collections ($SC_1$to SC_{12}) were made from district shimla wit altitude ranging between 1700-2700m; one collection (SC_{13}) from solan district at an altitude of 1700 m and three collections ($SC_{14}SC_{15}SC_{16}$) were made from kinnaur district with the altitudes ranging between 2300-2400 m these collections were then screened for bitter content so as to ascertain the bitter type available in nature, Data of bitter content

was recorded on three plant samples made from three different sites in a single location. Similarly data on soil parameters viz., pH available nitrogen (Kg^{ha-1}) available phosphorus (Kg^{ha-1}) and available potassium (Kg^{ha-1}) was recorded for all the collection sites. Data was analysed in RBD with three replications and sixteen treatments and reported as a mean of three collections.

RESULTS AND DISCUSSIONS:

Chemical screening of the material revealed a great deal of variation with respect to bitter content per cent (Table – 1) relatively higher bitter content of 1.14 per cent was recorded in the collection made from raccham (SC_{16}) in district Kinnaur followed by SC_{14} (1.10%),SC_{11}(1.09%), SC_{15} (1.08%).

The places from were these collections were made represents the altitudes ranging from 1700 to 2450 m and highest bitter content (1.14%) revealing collections was made from Raccham which is situated at 2300m, this indicates that more conducive altitude for bitter content yield is some what around 200m above mean sea level or more. The bitter content of 1.14 per cent as found in one of the collections (SC-16) is having consistent value to that reported by handa and prabhakar (1952) while they were standardizing the modified method for chemical assay of chirata further root thickness is this plant also seems to have a pertinent factor related with bitter content collections namely SC_{14}, SC_{15} and SC_{16} with root thickness of 0.62 cm 0.59 cm and 0.54 cm, respectively, registered relatively higher bitter content of 1.10, `1.08 and 1.14 per cent, respectively. This sows that root thickness is an important character for obtaining higher percentage of bitter principles as was also reported earlier studies (Anonymous 1976). In addition to this, increase in toot length has also been found having positive relationship with biter content, as SC-16 which as 6006 cm root length accounted for highest percentage of bitter content.

Observations recorded on soil parameters namely pH, available nitrogen (Kg^{ha-1}) available prosperous (Kg^{ha-1}) have and available potassium (Kg^{ha-1}) to have an insight upon the soil reaction and status of these nutrients prevailing at different places of collection (table -2) The pH value ranged from 5:2 to 7.9 and the most acidic and alkaline soils were noticed at kufri (shimla) and raccham (Kinnaur) respectively. The available nitrogen,. Phosphorus and potassium content ranted from 226.0Kg ha^{-1} to 375.48 kg hg^{-1}
51.52 kg ha^{-1} to 116.48 kg $ha^{-1,}$ and from 165.76 to 347.20 kg $ha^{-1,}$ respectively. The scrutiny of data of these soil parameters however did not led to any consistent feature which can be recognized for any set pattern of bitter content in plants collected from different places in nature. This indicates that biter content is the inherent potential possessed in different collections rather tan the effect of these soil factors. However the bitter content in this plant has sown an increasing trend above 6.0 pH and normal or slightly alkaline soil reaction seems to be more conducive for bitter content in this plant. Mcnair (1992) reported a positive relationship between alkaline soil and on volatile oil content of valeriana officinalis a positive effect of alkaline soil on volatile oil content of valeria officinalis. A positive effect of alkaline soil on volatile oil content of vakerana officinalis has been emphasised by berbec (1965) an in matricaria chamomilla E1 baddy and Hilal (1975). The increase in bitter content above 6.0 pH and normal to slightly alkaline soils is in conformity with the results obtained by these scientists.

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From the present studies it can thus be concluded that collections SC_{16}, Sc_{14}, Sc_{11}, C_{15}, SC_1 gave higher bitter content and cn be selected for cultivations and further improvement by adopting appropriate agrotechnolgy. Further the collections having higher root length ad thickness have been found to give better yield. Soil analysis have sown that normal to slightly alkaline soils are better for the production of bitter principles.

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Table 1. Places of collection and observations recorded in <u>Swertia chiravita</u> Karst

Collection number	Name of place district shimla	Altitude (m)	Root length (cm)	Root thickness (cm)	Bitter content (%)
*SC-1	Khadrala	2200	5.36	0.57	1.04*
SC-2	Sungri	2150	5.02	0.32	0.91
SC-3	Thatch	2350	5.28	0.34	0.98
SC-4	Khabal	2000	4.58	0.22	1.00
Sc-5	Larot	2300	5.00	0.61	1.03
SC-6	Tikri	2100	326	0.32	1.05
SC-7	Dhamwari	1900	2.56	0.32	0.92
SC-8	Matiana	2350	2.94	0.31	0.97
SC-9	Kufri	2800	2.90	0.29	0.99

SC-10	Mashobra	2450	1.46	0.28	1.02
SC-11	Chadwickfall	2400	5.24	0.53	1.09
SC-12	Kharapathar	2700	4.74	0.41	0.98
District solan					
SC-13	Dharon Ki Dhar District kinnaur	1700	3.68	0.31	0.75
SC-14	Sangla Kanda	2400	5.42	0.62	1.10
SC-15	Sangla	2350	4.31	0.59	1.08
SC-16	Raccham	2300	6.06	0.54	1.14

*SC denotes Swertia chiravita collections observed and analysed under natural as such conditions.

Table 2 Estimates of soil parameters made on soil samples collected from the sites of plant collection and bitter content per cent.

Collection number	pH	Available nutrients			Bitter content (%)
		N	P	M	
		Kg ha^{-1}			
SC-1	6.4	226.00	64.96	165.76	1.04
SC-2	5.9	295.90	70.58	208.32	0.91
SC-3	6.3	324.84	81.54	193.76	0.98
SC-4	6.8	275.91	78.40	302.40	1.00
SC-5	6.1	360.54	63.84	331.52	1.03
SC-6	6.5	286.80	60.32	184.80	1.05
SC-7	5.8	305.80	66.32	211.90	0.92
SC-8	6.1	319.06	68.08	215.04	0.97
SC-9	5.9	208.00	62.72	219.52	0.99
SC-10	6.0	375.48	51.52	193.54	1.02
SC-11	6.9	264.00	69.44	247.52	1.09
SC-12	6.9	284.00	69.44	247.52	0.88
SC-13	6.2	326.79	75.04	336.00	0.75
SC-14	7.7	280.72	116.48	347.20	1.10
SC-15	6.8	255.45	86.24	291.20	1.08
SC-16	7.9	246.44	67.20	286.72	1.14